CLAIMS:

What is claimed is:

1. An apparatus for occlusion testing primitives being processed in a graphics system, each primitive having a minimum Z value and a maximum Z value, the apparatus comprising:

logic configured to create a Z pyramid data structure, the Z pyramid data structure comprising at least first and second levels, each level comprising a plurality of regions, each region comprising a plurality of subregions, each subregion corresponding to a single Z value, each region corresponding to a plurality of Z values and having a maximum region Z value corresponding to the greatest of the Z values of the region, wherein each subregion in the second level has a Z value that corresponds to a maximum Z value of a plurality of subregions in the first level, said logic comparing the minimum Z value of each primitive with the Z value of a region associated with the tested primitive to determine whether or not the tested primitive is fully occluded.

2. The apparatus of claim 1, wherein if a determination is made that the tested primitive is not fully occluded, said logic determines whether or not any subregion of the region associated with the tested primitive is fully covered by the primitive, wherein if said logic determines that a subregion is fully covered by the tested primitive, then said logic determines whether or not the Z value of the covered subregion needs to be replaced with the maximum Z value of the tested primitive.

3. The apparatus of claim 2, wherein in order for said logic to determine whether the Z value of the covered subregion needs to be replaced with the maximum Z value of the tested primitive, said logic determines whether or not the maximum Z value of the tested primitive is less than the Z value for the covered subregion, wherein if said logic determines that the maximum Z value of the primitive is less than the Z value for the covered subregion, then the Z value for the covered subregion is replaced with the maximum Z value of the primitive.

4. The apparatus of claim 3, wherein said logic maintains a coverage mask for each level of the Z pyramid data structure, each coverage mask comprising a bit for each subregion of the level of the Z pyramid data structure associated with the coverage mask, wherein when said logic determines that the maximum Z value of the primitive is less than the Z value for the covered subregion, a bit in the coverage mask associated with the covered subregion is set.

5. The apparatus of claim 4, wherein when all of the coverage mask bits corresponding to the subregions of a particular region have been set in the coverage mask associated with the first level of the Z pyramid data structure, a bit is set for the corresponding region in the coverage mask associated with the second level up in the Z pyramid data structure.

6. The apparatus of claim 5, wherein when all of the bits in the coverage mask have been set for a particular region in the coverage mask, said logic replaces the maximum Z value for the particular region with the maximum Z value of all of the subregions associated with the particular region.

7. The apparatus of claim 6, wherein when all of the bits in the coverage mask have been set for a particular region in the coverage mask, said logic sets the corresponding bit in the coverage mask for a next level up in the Z pyramid.

8. The apparatus of claim 7, wherein the primitives are occlusion tested in a tiler component of the graphics system and wherein the Z pyramid data structure is updated by the tiler component on the fly as primitives are being processed through the graphics system.

9. The apparatus of claim 8, wherein the graphics system is comprised as part of a computer graphics display system, the tiler component being in communication with a Z pyramid memory element, the Z pyramid memory element storing the Z pyramid data structure.

10. The apparatus of claim 9, wherein the Z pyramid memory element is periodically updated with pixel level Z values, the pixel level Z values corresponding to Z values of primitives which have been scan converted into screen coordinates corresponding to locations on the display monitor, and wherein the pixel level Z values are used by the tiler component to periodically reconstruct the Z pyramid data structure.

11. A method for occlusion testing primitives in a graphics system, each primitive having a minimum Z value and a maximum Z value, the method comprising the steps of:

generating a Z pyramid data structure, the Z pyramid data structure comprising at least first and second levels, each level comprising a plurality of regions, each region comprising a plurality of subregions, each subregion corresponding to a single Z value, each region corresponding to a plurality of Z values and having a maximum region Z value corresponding to the greatest of the Z values of the region, wherein each subregion in the second level has a Z value that corresponds to a maximum Z value of a plurality of subregions in the first level; and

comparing the minimum Z value of each primitive with the Z value of a region associated with the tested primitive to determine whether or not the tested primitive is fully occluded.

12. The method of claim 11, wherein if a determination is made that the tested primitive is not fully occluded, the method further comprises the steps of:

determining whether or not any subregion of the region associated with the tested primitive is fully covered by the primitive and

if a determination is made that a subregion is fully covered by the tested primitive, determining whether or not the Z value of the covered subregion needs to be replaced with the maximum Z value of the tested primitive.

13. The method of claim 12, wherein the step of determining whether the Z value of the covered subregion needs to be replaced with the maximum Z value of the tested primitive includes the step of:

determining whether or not the maximum Z value of the tested primitive is less than the Z value for the covered subregion; and

if a determination is made that the maximum Z value of the primitive is less than the Z value for the covered subregion, replacing the Z value for the subregion with the maximum Z value of the primitive.

14. The method of claim 13, further comprising the step of:

maintaining a coverage mask for each level of the Z pyramid data structure, each coverage mask comprising a bit for each subregion of the level of the Z pyramid data structure associated with the coverage mask, wherein when a determination is made that the maximum Z value of the primitive is less than the Z value for the covered subregion, a bit in the coverage mask associated with the covered subregion is set.

15. The method of claim 14, wherein when all of the coverage mask bits corresponding to the subregions of a particular region have been set in the coverage mask associated with the first level of the Z pyramid data structure, a bit is set for the corresponding region in the coverage mask associated with the next level up in the Z pyramid data structure.

16. The method of claim 15, wherein when all of the bits in the coverage mask have been set for a particular region in the coverage mask, the maximum Z value for the particular region is replaced with the maximum Z value of all of the subregions associated with the particular region.

17. The method of claim 16, wherein when all of the bits in the coverage mask have been set for a particular region in the coverage mask, the corresponding bit in the coverage mask is set for a next level up in the Z pyramid.

18. An apparatus for occlusion testing primitives being processed in a graphics system, each primitive having a minimum Z value and a maximum Z value, the apparatus comprising:

means for creating a Z pyramid data structure, the Z pyramid data structure comprising at least first and second levels, each level comprising a plurality of regions, each region comprising a plurality of subregions, each subregion corresponding to a single Z value, each region corresponding to a plurality of Z values and having a maximum region Z value corresponding to the greatest of the Z values of the region, wherein each subregion in the second level has a Z value that corresponds to a maximum Z value of a plurality of subregions in the first level; and

means for comparing the minimum Z value of each primitive with the Z value of a region associated with the tested primitive to determine whether or not the tested primitive is fully occluded.

19. The apparatus of claim 18, wherein if a determination is made that the tested primitive is not fully occluded, said comparing means determines whether or not any subregion of the region associated with the tested primitive is fully covered by the primitive, wherein if said comparing means determines that a subregion is fully covered by the tested primitive, then said comparing means determines whether or not the Z value of the covered subregion needs to be replaced with the maximum Z value of the tested primitive.

20. The apparatus of claim 19, wherein in order for said comparing means to determine whether the Z value of the covered subregion needs to be replaced with the maximum Z value of the tested primitive, said comparing means determines whether or not the maximum Z value of the tested primitive is less than the Z value for the covered subregion, wherein if said comparing means determines that the maximum Z value of the primitive is less than the Z value for the covered subregion, then said comparing means replaces the Z value for the subregion with the maximum Z value of the primitive.